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MACPHERSON KWOK CHEN & HEID LLP			LAXTON, GARY L	
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SAN JOSE, CA 95110			2838	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/608,314	Applicant(s) JANG ET AL.	
	Examiner Gary L. Laxton	Art Unit 2838	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-82 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 17-29 and 48-82 is/are allowed.
- 6) ☒ Claim(s) 1-16, 30-33 and 35-47 is/are rejected.
- 7) ☒ Claim(s) 34 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 June 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Inventorship

1. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the snubber circuit of at least claim 16 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure

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is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 2, 4-11, 14, and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by the admitted prior art figure 3 (APA figure 3).

APA figure 3 discloses an isolated boost converter for driving an output load, comprising: an input voltage source (V_{in}); a boost inductor (L_B) connected in series with the input voltage source; a storage capacitor (C_B) which receives energy from the input voltage source; a transformer (TR) including a primary winding and secondary winding; first and second switches (S_1 , S_2) that couple the storage capacitor to the primary winding of the transformer; an output filter (L_F) coupled to the output load (V_o); a rectifier (D_{R1} , D_{R2}) coupling the secondary winding of the transformer to the output filter; and a switch control circuit to simultaneously open and close the first and second switches (see specification page 2 lines 12-24). Plurality of diodes (D_1 , D_2 , D_3) that provide a current path for the current of the boost inductor, and provide decoupling and core reset. When the switches are closed the storage capacitor is coupled across the primary winding of the transformer, thereby transferring energy stored in the storage capacitor to the output load, while energy in the boost inductor is increased, and wherein, when the first and second switches are open, the energy stored in the boost inductor is transferred to the storage capacitor.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over APA figure 3 in view of Wittenbreder (US 6,507,176).

APA figure 3 discloses the claimed subject matter in regards to claim 1 supra, except for the diodes clamp parasitic ringing across the primacy winding.

Wittenbreder teach using diodes to clamp parasitic ringing (cols. 37-39).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the prior art figure 3 to include diodes that clamp the parasitic ringing across the primary as taught by Wittenbreder in order to suppress the ringing.

8. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over APA figure 3 in view of Peterson (US 6,191,957).

Claims 12 and 13; APA figure 3 discloses the claimed subject matter in regards to claim 1 supra, except for a sensing and reference circuit.

Sensing the output and controlling a converter to produce a particular output voltage and to control the inductor current in continuous current mode (CCM) or discontinuous mode (DCM) is well known in the art. Peterson is just one example of providing sensing and referencing of the output and controlling of the primary circuit switches in order to produce and output voltage (col. 1 lines 10-40)

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify APA figure 3 to include sensing and reference circuitry to assist in the control of the inductor current and to produce an output voltage as taught by

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Petersen in order to produce a particular regulated output voltage for use by a load demanding a specific well regulated driving voltage.

9. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over APA figure 3 in view of Zhu et al (US 6,452,815).

Claim 16; APA figure 3 discloses the claimed subject matter in regards to claim 1 supra, except for a snubber circuit.

Zhu et al teach an isolated boost converter having a snubber circuit to protect the primary circuit switches from voltage spikes during switching conditions.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the prior art figure 3 to include a snubber circuit in order to protect the primary circuit switches from voltage spikes during switching conditions as taught by Zhu et al (abstract).

10. Claims 30, 31, 33, 37-42, 45 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ke et al (US 6,538,906) in view of APA figure 3.

Claims 30, 33, 37-42, 45, and 46; Ke et al disclose an input voltage source (V_{in}), a capacitor (C_r), transformer (TR), first, second, and third switches (S_1 , S_2 , S_3) for coupling the capacitor to the primary; output filter (L_1 , C_2) coupled to a load; rectifier (D_1 , D_2); switch control for periodically opening and closing the switches (col. 2 lines 25-30).

However, Ke et al does not disclose the input voltage source is connected to a boost inductor.

Ke et al do teach that the energy storage circuit can be used in any type of DC-DC converter, such as boost converter with boost switch voltage as charging source.

Furthermore, APA figure 3 teaches an isolated boost converter using a boost inductor in series with the input voltage for providing a boosted output voltage.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Ke et al to include a boost inductor in series with the voltage source as taught by APA figure 3 in order to provide a boost converter having a boosted voltage at the output.

Claim 31; Ke et al and APA figure 3 both disclose plural diodes for providing current paths and decoupling the primary and resetting the transformer (Ke et al: col. 2 lines 25-30).

11. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ke et al (US 6,538,906) and APA figure 3 in view of Wittenbreder (US 6,507,176).

Ke et al and APA figure 3 disclose the claimed subject matter in regards to claim 30 supra except for the diodes clamp parasitic ringing across the primary winding.

Wittenbreder teach using diodes to clamp parasitic ringing (cols. 37-39).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Ke et al and the prior art figure 3 to include diodes that clamp the parasitic ringing across the primary as taught by Wittenbreder in order to suppress the ringing.

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12. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ke et al (US 6,538,906) and APA figure 3 in view of Zhang et al (US 6,466,458).

Ke et al and APA figure 3 disclose the claimed subject matter in regards to claim 30 supra except for a blocking capacitor is series with the primary winding.

Zhang et al teach, figure 4, a blocking capacitor C_b, which is connected in series with the primary winding, offers a DC bias to keep the voltage-second balance for the transformer.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Ke et al and the prior art figure 3 to include a blocking capacitor C_b, connected in series with the primary winding, in order to offer a DC bias to keep the voltage-second balance for the transformer as taught by Zhang et al.

13. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ke et al (US 6,538,906) and APA figure 3 in view of Gurwicz (US 6,256,209).

Ke et al and APA figure 3 disclose the claimed subject matter in regards to claim 30 supra except for the third switch having an anti-parallel diode.

Gurwicz et al teaches that it is necessary to commutate currents flowing in the transformer's stray and magnetizing inductances so it is necessary to connect diodes (21, 22, 23 and 24) in anti-parallel across respective switching devices employed in the inverter network.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Ke et al and the prior art figure 3 to include a diode in anti-parallel with the third switch in order to commutate any currents flowing in the transformer's stray and magnetizing inductances as taught by Gurwicz (col. 4 lines 30-35).

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14. Claims 43 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ke et al (US 6,538,906) and APA figure 3 in view of Peterson (US 6,191,957).

Claims 43 and 44; Ke et al and APA figure 3 disclose the claimed subject matter in regards to claim 30 supra, except for a sensing and reference circuit.

Sensing the output and controlling a converter to produce a particular output voltage and to control the inductor current in continuous current mode (CCM) or discontinuous mode (DCM) is well known in the art. Peterson is just one example of providing sensing and referencing of the output and controlling of the primary circuit switches in order to produce and output voltage (col. 1 lines 10-40)

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify APA figure 3 to include sensing and reference circuitry to assist in the control of the inductor current and to produce an output voltage as taught by Petersen in order to produce a particular regulated output voltage for use by a load demanding a specific well regulated driving voltage.

15. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ke et al (US 6,538,906) and APA figure 3 in view of Zhu et al (US 6,452,815).

Ke et al and APA figure 3 disclose the claimed subject matter in regards to claim 30 supra except for a snubber circuit.

Zhu et al teach an isolated boost converter having a snubber circuit to protect the primary circuit switches from voltage spikes during switching conditions.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the prior art figure 3 to include a snubber circuit in order to protect the primary circuit switches from voltage spikes during switching conditions as taught by Zhu et al (abstract).

Allowable Subject Matter

16. Claims 17-29 and 48-82 are allowed.

17. Claim 34 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

18. The following is a statement of reasons for the indication of allowable subject matter:

Claims 17-29; prior art fails to disclose or suggest, inter alia, an isolated boost converter having a fourth diode having the anode terminal connected to the anode terminal of a second diode and the cathode terminal of the fourth diode connected to a second terminal of a primary winding of a transformer.

Claim 34; prior art fails to disclose or suggest, inter alia, an isolated boost converter comprising a third switch when closed, energy stored in the boost inductor is transferred to the output load and the capacitor, and when the first and second switches are closed, energy stored in the capacitor is transferred to the output load, while energy in the boost inductor connected is

being increased, and when the first, second, and third switches are open, the energy stored in the boost inductor is transferred to the capacitor.


Claims 48-64; prior art fails to disclose or suggest, inter alia, an isolated boost converter having a first switch and a second switch; a first diode and second diode, the anode terminal and cathode terminal of the first diode being connected to the first terminals of the first and second switches, respectively, and the anode and cathode terminal of the second diode being connected to the second terminal of the first and second switches, respectively; a first terminal of a primary winding being connected to the anode terminal of the first diode; a third switch, the first terminal of the third switch being connected to the second terminal of the primary winding and the second terminal of the third switch connected to the second terminal of the second switch; a third diode, the anode terminal being connected to the first terminal of the third switch and the cathode terminal of the third diode connected to the first terminal of the second switch.

Claims 65-82; prior art fails to disclose or suggest, inter alia, an isolated boost converter having first, second, third, fourth, fifth, and sixth switches, coupling a capacitor and a boost inductor to the primary winding of a transformer; a switch control circuit to periodically open and close the first, second, and third switches during each positive half cycles of the ac input voltage source and to periodically open and close fourth, fifth, and sixth switches during each negative cycle of the AC input voltage source.

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gary L. Laxton whose telephone number is (571) 272-2079. The examiner can normally be reached on Monday thru Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Sherry can be reached on (571) 272-2084. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Gary L. Laxton
Patent Examiner
Art Unit 2838
9/15/04